

WHAT IS CLAIMED IS

1. A read/write arrangement comprising:
 - a cantilever disposed with a medium which is movable relative to the cantilever;
 - a device associated with the cantilever and which is configured to be responsive to changes in electrical field between the medium and the cantilever caused by a change in distance between the medium and the cantilever;
 - a heater disposed on the cantilever for selectively heating the medium and for inducing localized topographical changes which represent bits of data; and
 - a circuit which electrically interconnects both of the device and the heater.
2. A read/write arrangement as set forth in claim 1, wherein the circuit forms at least a part of one of the device.
3. A read/write arrangement as set forth in claim 1, wherein the circuit has portions which are common to both the device and the heater.
4. A read/write arrangement as set forth in claim 1, further comprising a select switch which is circuited in series with the heater and the device and which controls the passage of current through the heater and device.
5. A read/write arrangement as set forth in claim 4 wherein the select switch comprises a FET (Field Effect Transistor).
6. A read/write arrangement as set forth in claim 4, further comprising a circuit which is connected with the serially connected select switch, heater and device, the circuit being configured to apply a fixed dc current to the serially connected select switch, heater and device using first and second current sources and first and second voltages sources wherein the first and second voltage sources apply a voltage across the serially connected select switch, heater and device.

7. A read/write arrangement as set forth in claim 6, wherein the circuit is further configured so that the voltages from the voltage sources are applied across the serially connected select switch, heater and device via virtual shorts of trans-impedance amplifiers.
8. A read/write arrangement as set forth in claim 1, wherein the cantilever comprises a probe which extends from the cantilever and which is configured to be contactable with a surface of the medium and to respond to a topography of the medium to cause the distance between the cantilever and the medium to vary.
9. A read/write arrangement as set forth in claim 1, wherein the medium is electrically non-conductive and is supported on an electrically conductive substrate.
10. A read/write arrangement as set forth in claim 1, wherein the device is a FET (Field Effect Transistor).
11. A read/write arrangement as set forth in claim 10, wherein the circuit comprises a plurality of electrically conductive traces which are formed in the cantilever and which comprise a source and a drain of the FET and wherein the source or drain of the FET forms part of a circuit which supplies electrical current to the heater.
12. A read/write arrangement as set forth in claim 11, wherein the plurality of electrically conductive traces further comprise a channel interposed between the source and the drain of the FET.
13. A read/write arrangement as set forth in claim 11, wherein the cantilever is made of silicon and the electrically conductive traces are formed by doping the silicon to render selected regions electrically conductive.

14. A read/write arrangement as set forth in claim 11, wherein the heater comprises a doped region having an electrical resistance which is higher than the traces.
15. A read/write arrangement as set forth in claim 13, wherein the cantilever has a pair of arms which are interconnected by a bridge member, wherein the probe is formed on the bridge member, wherein the heater is formed on the bridge member and wherein the doped traces are formed on both arms.
16. A read/write arrangement as set forth in claim 10, wherein the FET is configured to function as the heater.
17. A read/write arrangement as set forth in claim 10, wherein the device is an induced channel FET (Field Effect Transistor).
18. A read/write arrangement as set forth in claim 3, wherein the medium is electrically non-conductive and is supported on a substrate which is electrically conductive, and wherein the substrate is configured to be circuited with the FET so that variations in the electrical field which result from a change in distance between the medium and the cantilever, induces a change in electrical current passing through the FET, and produces a read signal.
19. A read/write arrangement as set forth in claim 15, wherein the bridge member interconnects the outboard ends of the cantilever and further comprises a second bridge which is located inboard of the first said bridge and on which the FET is formed.
20. A read/write arrangement as set forth in claim 19, wherein the FET comprises a plurality of source portions and a plurality of drain portions which are interleaved with the plurality of source portions.

21. A read/write arrangement as set forth in claim 20, further comprising a plurality of channel portions which each disposed between a source portion and a drain portion.

22. A read/write arrangement for a contact probe atomic resolution storage system, comprising:

- a cantilever disposed with an electrically non-conductive medium which is movable relative to the cantilever, the cantilever having a probe which is configured to follow a topography of the medium;

- a device formed in the cantilever which responds to a change in electric field induced by a change in distance between the cantilever and a substrate on which the medium is supported; and

- a heater disposed in the cantilever and circuited with the device.

23. A read/write arrangement as set forth in claim 22, further comprising a select switch which is circuited in series with the heater and the device, and which controls the passage of current through the heater and device.

24. A read/write arrangement as set forth in claim 23, wherein the select switch comprises a FET (Field Effect Transistor).

25. A read/write arrangement as set forth in claim 23, further comprising a circuit which is connected with the serially connected select switch, heater and device, the circuit being configured to apply a fixed dc current to the serially connected select switch, heater and device using first and second current sources and first and second voltages sources wherein the first and second voltage sources apply a voltage across the serially connected select switch, heater and device.

26. A read/write arrangement as set forth in claim 25, wherein the circuit is further configured so that the voltages from the voltage sources are applied across the serially connected select switch, heater and device via virtual shorts of trans-impedance amplifiers.

27. A read/write mechanism as set forth in claim 22, wherein the device is a FET (Field Effect Transistor).

28. A read/write mechanism as set forth in claim 27, wherein the FET has source and drain portions formed in the cantilever, and wherein the heater is formed in the cantilever and circuited with the source and drain portions of the FET.

29. A read/write mechanism as set forth in claim 27, wherein the device is an induced channel FET.

30. A read/write mechanism as set forth in claim 27, wherein the cantilever is formed of silicon and the heater comprises a doped portion which is electrically connected with doped regions that form a source and a drain of the FET.

31. A method of making a read/write arrangement comprising: ✓
forming a FET in a silicon cantilever by doping electrically conductive source and drain regions in a selected surface of the cantilever, the FET being configured to be gated by an electric field which is generated by applying a bias to a substrate separate from the cantilever;
forming a probe on the selected surface of the cantilever; and
forming a heater in the cantilever proximate the probe.

32. A method as set forth in claim 31, further comprising:
forming the cantilever to have arms and an end bridge portion which interconnects terminal outboard ends of the arms; and
forming the probe and the heater on the end bridge portion.

33. A method as set forth in claim 31, further comprising:
forming a select switch in series with the heater and the device; and

configuring the select switch to control the passage of current through the heater and device.

34. A method as set forth in claim 33, comprising the step of forming the select switch to comprises a FET (Field Effect Transistor).

35. A method as set forth in claim 33, further comprising:
forming a circuit which is serially connected with the select switch, heater and device,

configuring the circuit to apply a fixed dc current to the serially connected select switch, heater and device using first and second current sources, and the voltage applied across the serially connected select switch, heater and device through the use of first and second voltage sources.

36. A method as set forth in claim 35, further comprising configuring the circuit so that the voltages from the voltage sources are applied across the serially connected select switch, heater and device via virtual shorts of trans-impedance amplifiers.

37. A method as set forth in claim 32, further comprising configuring the FET to function as the heater.

38. A method as set forth in claim 32, further comprising forming the source and drain regions of the FET in the arms of the arms of the cantilever.

39. A method as set forth in claim 32, further comprising:
forming a second bridge between the arms of the cantilever; and
forming the source and drain portions of the FET on the second bridge portion.

40. A method as set forth in claim 32, comprising:
forming a first drain region of the FET on a first arm of the cantilever;

forming a first source region of the FET on a first arm of the cantilever;
forming a second drain region of the FET on a second arm of the cantilever;

forming a second source region of the FET on a second arm of the cantilever; and

forming a doped region on the end bridge portion which forms the heater so as to be electrically connected with one of the first and second source regions, and the first and second drain regions.

41. A method as set forth in claim 40, further comprising forming first and second channel portions on the first and second arms respectively.

42. A method as set forth in claim 40, further comprising forming the first and second drain regions to have a common portion which spans the end bridge portion.

43. A read/write arrangement comprising:

FET means formed in a silicon cantilever by doping electrically conductive source and drain regions in a selected surface of the cantilever, for being gated by an electric field which is generated by applying a bias to a substrate separate from the cantilever;

a probe on the selected surface of the cantilever; and

heater means in the cantilever proximate the probe for heating and forming a data bit indicative topography in a medium to be engaged by the probe.

44. A read/write arrangement as set forth in claim 43, wherein the cantilever has arms and an end bridge portion which interconnects terminal outboard ends of the arms, and wherein the probe and the heater are formed on the end bridge portion.

45. A read/write arrangement as set forth in claim 43, further comprising select switch means connected in series with the heater and the device for controlling the passage of current through the heater and device.

46. A read/write arrangement as set forth in claim 45, wherein the select switch comprises a FET (Field Effect Transistor).

47. A read/write arrangement as set forth in claim 45, further comprising:
circuit means serially with the select switch, heater and device for applying a fixed dc current to the serially connected select switch, heater and device, using first and second current sources; and

voltage control means having first and second voltage sources for controlling the voltage applied across the serially connected select switch, heater and device.

48. A read/write arrangement as set forth in claim 47, wherein the circuit is configured so that the voltages from the voltage sources are applied across the serially connected select switch, heater and device via virtual shorts of trans-impedance amplifiers.

49. A read/write arrangement as set forth in claim 43, wherein the FET means is configured to function as the heater.

50. A read/write arrangement as set forth in claim 43, wherein the source and drain regions are formed in the arms of the cantilever.

51. A read/write arrangement as set forth in claim 43, wherein the cantilever further comprises a second bridge between the arms of the cantilever and wherein source and drain portions of the FET are formed on the second bridge portion.

52. A read/write arrangement as set forth in claim 43, wherein:
a first drain region of the FET is formed on a first arm of the cantilever;

a first source region of the FET is formed on a first arm of the cantilever;
a second drain region of the FET is formed on a second arm of the cantilever;

a second source region of the FET is formed on a second arm of the cantilever; and

a doped region on the end bridge portion which forms the heater, is electrically connected with one of the first and second source regions and the first and second drain regions.

53. A read/write arrangement as set forth in claim 52, wherein first and second channel portions are formed on the first and second arms respectively.

54. A read/write arrangement as set forth in claim 52, wherein the first and second drain regions are formed to have a common portion which spans the end bridge portion.

55. A read/write arrangement comprising: 

a cantilever disposed with a medium which is movable relative to the cantilever; and

a device associated with the cantilever and which is configured to be responsive to changes in electrical field between the medium and the cantilever caused by a change in distance between the medium and the cantilever, the device comprising a plurality of interleaved sensor elements which extend in juxtaposed proximity to one another.

56. A read/write arrangement as set forth in claim 55, further comprising:
a heater disposed on the cantilever for selectively heating the medium and for inducing localized topographical changes which represent bits of data.

57. A read/write arrangement as set forth in claim 55, wherein the interleaved sensor elements comprise source and drain portions of a FET (Field Effect Transistor).

58. A read/write arrangement as set forth in claim 57, wherein the cantilever comprises two legs and a bridge portion which interconnects the legs, and wherein the device is formed on the bridge portion.

59. A read/write arrangement as set forth in claim 56, wherein the cantilever comprises two legs and first and second bridge portions which respectively interconnect the legs, and wherein the device is formed on one the bridge portions and the heater is formed on the other of the bridge portions.

60. A read/write arrangement as set forth in claim 58, further comprising electrically conductive traces formed along each leg, the electrically conductive traces forming part of a circuit which is electrically connected with the interleaved source and drain portions of the FET.

61. A read/write arrangement as set forth in claim 60, wherein the traces form part of a circuit which is electrically connected with a heater which is formed on the cantilever.

62. A read/write arrangement as set forth in claim 61, wherein the traces which form part of the circuit that is electrically connected with the FET and the traces electrically isolated from one another.